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Towel Testing

Purpose: To practice the skills used to design experiments

Problem: Many brands of paper towels claim that they are the strongest. Research is needed to determine which brand of paper towel really is the strongest.

Background Information: Since paper towels are usually wet when they are being used, the "wet strength" of the towel is important. Wet strength is the strength of paper when it is wet. This can be measured by the amount of mass that a wet paper towel can hold.

The Task: To design an experimental investigation (a fair test) to test the strength of three different brands of paper towels. You will have these materials to conduct the experiment:

3 Brands of paper towels	1 ball Jar	Water
Graduated cylinder	Pennies	Triple Beam Balance

Step 1: Identify the **INDEPENDENT VARIABLE** [*what you will change, or the difference between the groups*], the **DEPENDENT VARIABLE** [*what you will observe and measure, the data that you will collect*], and all of the **CONTROLLED VARIABLES** you can think of [*all of the variables that could change, but won't*].

- ✓ Independent Variable:

type of paper

- ✓ Dependent Variable:

Strength mass

- ✓ Controlled Variables:

water, cubes, beaker

→ more specific

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Step 2: Write a RESEARCH QUESTION using *affect* or *effect*.

Which brand of paper is the strongest when it is effected by water?

Step 3: Write a HYPOTHESIS that shows the expected *relationship* between the variables. Use an IF, THEN statement.

If the brand soaks up the most water than the stronger it will be. I think that the Mard! Gras will be the strongest.

Step 4: Design an EXPERIMENTAL INVESTIGATION to *test your hypothesis*.
Decide:

- ✓ What your specific independent variables are:
brand of paper
- ✓ What you are going to observe and measure:
The strength of the paper.
- ✓ How you will do the measuring:
adding 10ml of water and adding cubes to see its breaking point.
- ✓ How many trials you will have:
3 trials

Step 5: Write the **PROCEDURE** you will follow during your investigation, *step-by-step*.

1. Take a 20cm x 20cm paper and place it on top of the beaker.
2. Put a rubberband around the paper to keep it tight.
3. Using an eyedropper drop 20ml of water on the center of the paper.
4. Then apply cubes until the paper breaks.
5. Weigh the cubes for the strength.
6. Repeat twice with each paper towel.
7. Record in a table.

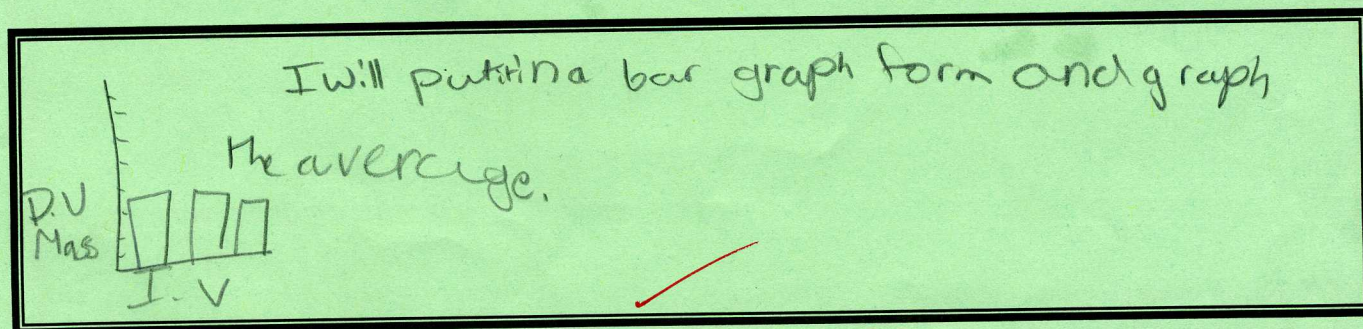


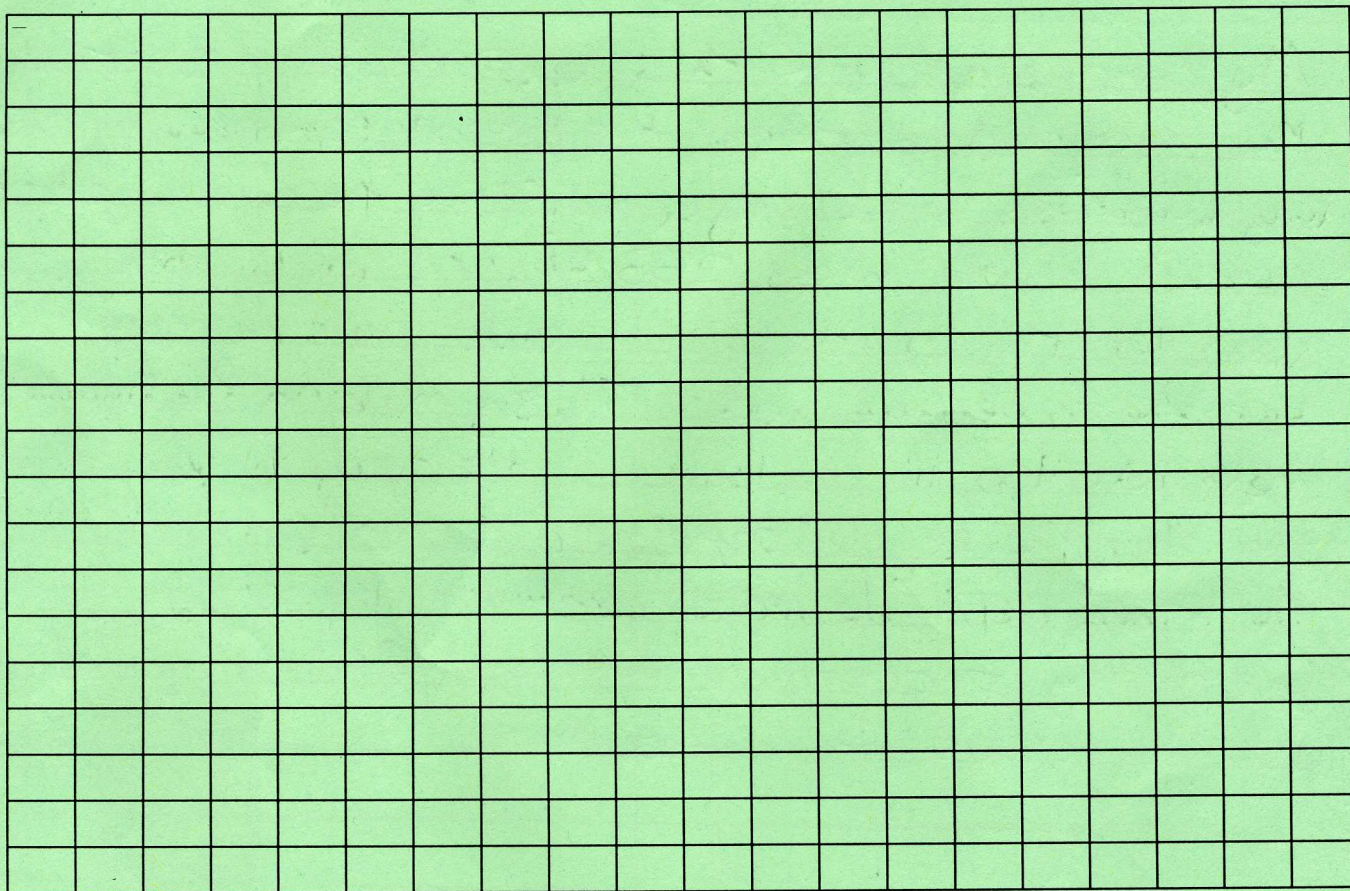
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Step 6: Make the **DATA TABLE** to record your data. Include a place for your *reduced data & measures of central tendency* [average].

Brand	Trial 1	Trial 2	Trial 3	Total	Average
Recycled	129.5 _g	324.3 _g	308.1 _g	761.9 _g	253.96 _g
Zeina	31.5 _g	119.7 _g	62.5 _g	213.7 _g	71.23 _g
Mardi Gras	133.9 _g	182.1 _g	149.4 _g	515.4 _g	171.8 _g
Flora	5.4 _g	20.4 _g	10.7 _g	37 _g	12.3 _g

Step 7: Make a **GRAPH** of your reduced data. Remember **DRY MIX** and **TAILS**. Explain what type of graph you will use and why.





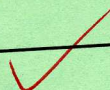
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Step 8: ANALYZE your data: What story does the graph tell? What do you know about the effect of the independent variable on the dependent variable?

The story that the graph tells is that the recycled paper is stronger than the other brands. The effect of the independent variable on the dependent variable is the strength of the paper effects how much you can hold.

Step 9: Write a **CONCLUSION**. Answer your original questions. Accept or reject your hypothesis. Use actual data [real numbers] to provide evidence for what you say.

My conclusion on this experiment is that the recycled paper is the strongest proving that my hypothesis was rejected. Since the average for recycled paper was 253.96g and my hypothesis was that the mardi gras would hold the most but the average was 171.8g making the hypothesis rejected. Also, if you look at the graph you can see that the recycled paper held the most and the flora held the least amount of weight. Overall, my procedure worked efficiently and reliable results and accurate data.



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Centimeter Grid Paper

Thinking With Mathematical Models

